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SCIENCE NEWS LETTER



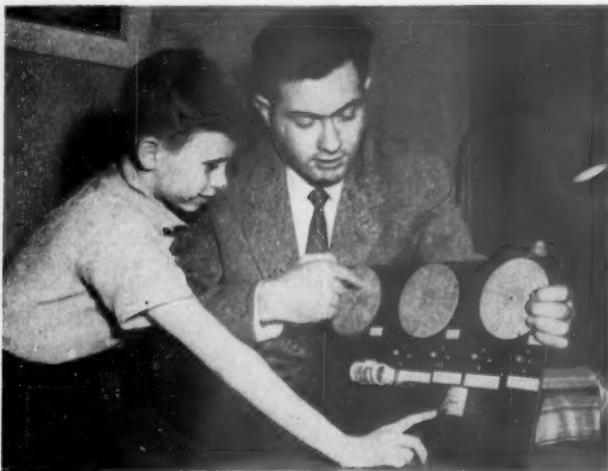
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Element Maker

See Page 309

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PHYSICS

H-Power Control Advances

Scientists are exploring the various possible ways of taming thermonuclear reactions in order to use hydrogen power for peaceful purposes.

► THREE NEW APPROACHES aimed at taming thermonuclear reactions for peaceful purposes were outlined to the American Physical Society meeting in Washington, D. C. They complement the so-called "pinch" method, which was reported at length in January, 1958. (See SNL, Feb. 1, p. 67.)

Immediate goal is to create a hot, fully ionized gas at a sufficiently high temperature and for a long enough period so that thermonuclear reactions will occur. Temperature of the hot gas, or plasma, must be approximately 100,000,000 degrees centigrade and the plasma must be isolated from the container walls for tenths of a second, or longer.

The business of igniting the plasma can be approached in a number of ways.

1. In the pinch method used at the Atomic Energy Commission's laboratories in Los Alamos, Berkeley and Livermore, tremendous currents are passed through the gas. The magnetic forces of the current itself throw the gas toward the center line of the tube. In other words, the current "pinches itself," with great increase in the density and temperature of the gas.

Straight tubes are often used in studying resulting effects but the main effort involves the use of doughnut-shaped tubes. There are many essential refinements to provide stability and long confinement.

2. In the mirror program proposed by Dr. R. F. Post of the University of California at Livermore, energetic ions (with accompanying electrons) are injected into a strong field provided by two large coils. At first, the ions run on spirals nearly at right angles to the field. Then the current in the big coils is increased. This squeezes the hot gas. In different designs, it is possible to squeeze the gas radially, and to push it together along the axis. It is also possible to push the gas from one chamber to another.

3. In the Princeton stellarators, a cold gas confined by a very strong magnetic field is used at the start. A small current is passed, and then a larger one is caused to flow by transformer action. This brings the gas to something more than 1,000,000 degrees centigrade. At that point this heating method is no longer satisfactory, because the electrical resistance of the gas has become too low. (A well-ionized gas may have an electrical resistance far less than that of a solid bar of copper occupying the same space.) Therefore, the next step is to shake the gas with very strong alternating magnetic fields. This heating process is called magnetic pumping.

Dr. Lyman Spitzer, director of Project Matterhorn and of Princeton University Observatory, showed that under these conditions the gas would drift toward the walls, and that this loss of gas could be largely avoided by bending the doughnut into a shape like a pretzel. Later, it was found good gas confinement could be achieved in a doughnut, by ingenious tailoring of the magnetic field. Both methods have been under study at Princeton.

4. The work reported from Oak Ridge National Laboratory is devoted to filling a confinement-space with super-hot ions; that is, ions which have an energy far superior to the ignition energy. It rests on some basic ideas worked out by Drs. E. D. Shipley, Lloyd P. Smith and Arthur E. Ruark, in 1952-53. An extremely hot plasma of low density has good confinement properties, and can be used to heat cooler ions that are added after the very hot plasma is formed. Loss of hot ions by trading of charges with the residual gas molecules in the vessel is a chief enemy in this method; it is also minimized when the ion-energy is very high, as others have shown.

Then Dr. John S. Luce, also of Oak Ridge, showed how the molecular ions can be trapped inside the confinement space. Dr.

Herbert York, now director of the Defense Department's Advanced Research Projects Agency, is reported to have advanced the same idea independently.

Molecular ions are introduced and are dissociated. Each molecular ion breaks up into an atomic ion (a deuteron) and an atom of deuterium. The atoms escape, but the hot ions are caught on smaller orbits and circulate in the confining magnetic field. The whole matter hinges on efficient dissociation of the molecular ions. It is not enough to let them encounter molecules of the residual gas.

Dr. Luce supplied an essential step when he developed a high-vacuum, high-current arc on which the high energy molecular ions can be broken up with considerable efficiency. So far work on this method has been done with continuous injection into mirror coils fed with DC current. Hence the apparatus is called the DC Experiment, or DCX.

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EDUCATION

Old Mathematics Best; Date Called Unimportant

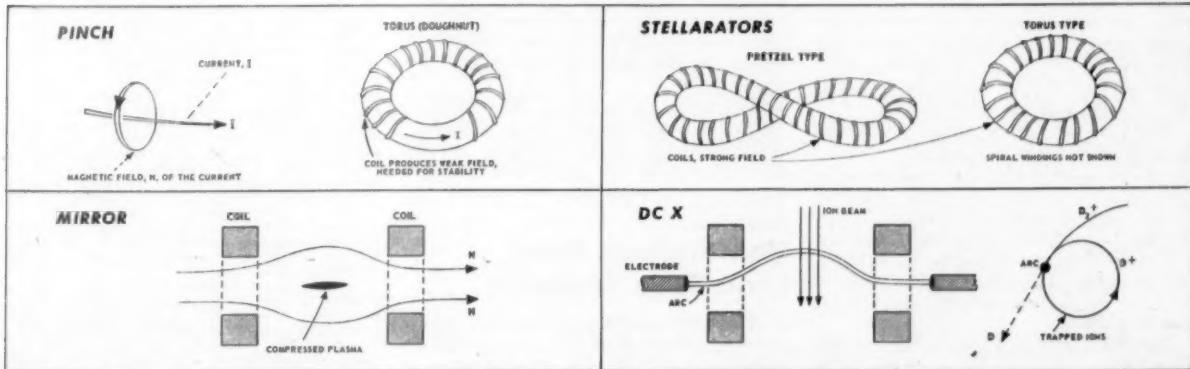
► SO-CALLED "modern mathematics" does not do as good a job in teaching as the old-fashioned kind that dates back 2,000 years to the days of Euclid, Prof. Morris Kline, director of the division of electromagnetic research at New York University's Institute of Mathematical Sciences, told the National Council of Teachers of Mathematics meeting in Cleveland.

"Up-to-dateness is totally irrelevant in mathematics," Prof. Kline said. "It has been built solidly since at least Greek times. . . Older portions do not become antiquated or useless."

Prof. Kline attacked the "moderns" for replacing the older mathematics by such topics as symbolic logic, Boolean algebra, set theory, and some topics as groups and fields, topology, and postulational systems. Statistics is the one new field that should be introduced for those not entering specialized fields, he suggested.

We must, however, make drastic improvement in the way we have been teaching traditional subjects, Prof. Kline believes.

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FOUR WAYS TO H-POWER—The drawings illustrate the four main methods for igniting plasma, essential to the use of H-power.

METEOROLOGY

Carbon-14 Maps Weather

► **RADIOACTIVE** carbon-14, produced either in H-bomb explosions or naturally, is a new tool meteorologists are using to help chart world-wide weather patterns.

L. Machta of the U. S. Weather Bureau said most of the man-made carbon-14 is carried by the rising atomic cloud into the stratosphere, more than 30,000 feet above the earth's surface.

Where this radioactive chemical later falls to earth is a clue to the mixing of stratospheric air with lower layers of the atmosphere, Mr. Machta told a joint Washington meeting of the American Geophysical Union and the American Meteorological Society.

Carbon-14 is produced by the action of neutrons on nitrogen in the atmosphere. It may be created either through cosmic ray bombardment or as a by-product of nuclear tests. (Carbon-14 was recently indicted by Dr. Linus Pauling of California Institute of Technology as a more deadly menace than strontium-90 to unborn generations.)

Naturally formed carbon-14, which loses half its radioactivity in 5,600 years, is uniformly distributed throughout the atmosphere as carbon dioxide. Measurements of increases in carbon-14 due to nuclear explosions indicate the locations and times this radioactive tracer was removed from the stratosphere.

Radioactive tracers have also been suggested for:

GEOPHYSICS

Forecast "Moon" Recovery

► **RETURNABLE** satellites with payloads of 100 pounds should be launched and recovered by the U. S. in 1959, or "perhaps" 1960, Dr. Herbert F. York, chief scientist for the Defense Department's Advanced Research Projects Agency (ARPA), said.

He also predicts U. S. launching of a one-ton satellite, rivaling the Russians' now defunct sputnik II, within five years.

Dr. York forecast that within a year the U. S. would be launching earth-circling satellites with payloads of 100 to 300 pounds, using the first stages of the intermediate range ballistic missiles (IRBM) Jupiter and Thor to boost them into a 200-mile orbit. Later satellites of this weight range would return about half the total payload.

ARPA is the agency designated by the Defense Department to handle the military aspects of space exploration and research.

Dr. York told the American Physical Society meeting in Washington, D. C., that the next "big advance" in payload launching will result from use of appropriately modified IRBM's. The modifications will be primarily in the fuel and oxidizer tankage, and in guidance.

The IRBM first stages are in the 100,000-pound thrust class and ultimately should be capable of launching up to 700 pounds of net payload into a 200-mile orbit.

1. Studying movements of the fast-moving rivers of air high in the atmosphere known as jet streams.

2. Determining the effects of cold air masses found over the Arctic and Antarctic on the world's weather.

3. Spotting local sources of moisture for rainfall.

4. Charting the exchange of air between Northern and Southern Hemispheres.

The forces at work thousands of miles above the earth's surface, rather than the thousands of feet where weather is made, were described by Drs. Serge A. Korff and Arthur Beiser of New York University.

They studied the electromagnetic forces in nearby space by charting variations in the intensity of cosmic ray bombardment at the earth's surface on a planet-wide basis, Drs. Korff and Beiser suggested these forces are gradually slowing down the earth's rotation period.

They believe electromagnetic forces are twice as powerful in braking the earth's spinning rate as is tidal friction in ocean basins. They suggest this mechanism to account for the difference between the observed rate by which the day is lengthened, about 16 ten-thousandths of a second per century, and the contribution to slowing caused by tidal friction.

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For space vehicles traveling to the moon or planets, Dr. York said payloads up to 100 pounds could be sent if the upper stages of the rocket launcher were specifically designed for interplanetary travel. If an extra stage were added to a rocket designed for launching an earth satellite, the moon or Mars vehicle could have a payload of only 60 pounds or so.

Any equipment for slowing down a lunar rocket so that it would orbit the moon would cut the payload in half. Rockets sufficient for a landing soft enough so that instruments would survive the impact would reduce the payload to 15% to 30% of the escape payload.

The next step in the U. S. space race, Dr. York said, would involve using intercontinental ballistic missiles (ICBM's), which have boosters in the 200,000-pound range.

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AGRICULTURE

Hopi Indians Help Lima Bean Breeders

► **NEMATODE-RESISTANT** lima beans are available to growers this year, thanks to the Hopi Indians and a group of state and U. S. Department of Agriculture scientists.

The new variety will produce as much as three times as many beans per acre on nematode-infested soils as other varieties. Also, USDA scientists reported, its yield on nematode-free soil is only slightly less than older limas.

Lima beans selected by the Hopi Indians for adaptability to their infested soils in Arizona were crossed with commercially accepted varieties. The baby, green-seeded line that finally resulted was field tested for five years before being released to seed growers.

Enough stocks of the new variety, named Nemagreen, have been built up for commercial growers and gardeners in the nematode areas. It can be obtained through seed companies, not through the USDA.

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CHEMISTRY

Dispute Discovery of 102

Research with the heavy ion linear accelerator (HILAC) at the University of California has confronted scientists with a puzzle concerning who has discovered the new element 102.

See Front Cover

► UNIVERSITY of California scientists have announced definite discovery of an isotope of element 102. Simultaneously they reported they had been unable to duplicate the work of an international team of scientists who said last year they had discovered element 102. (See SNL, July 20, 1957, p. 35.) An element is considered discovered whether it is first isolated as the element or as one of its isotopes.

The new research was reported at a conference in Gatlinburg, Tenn., on reactions between complex nuclei, by Albert Ghiorso, senior scientist at Berkeley, Torbjorn Sikkeland of the Joint Establishment for Nuclear Energy Research, Kjeller, Norway, John R. Walton, research chemist, and Dr. Glenn T. Seaborg, Nobel laureate and professor of chemistry.

The photograph on the cover of this week's SCIENCE NEWS LETTER shows the heavy ion linear accelerator (HILAC) built by the Atomic Energy Commission with which the discovery was made. Final identification occurred April 18 after three months' experimentation.

The new isotope was created by bombarding curium-246 with carbon-12 nuclei having energy of 68,000,000 electron volts (68 MEV) or carbon-13 nuclei of 75 MEV.

It has an atomic weight of 254 and a half life of three seconds.

The new isotope decays by emitting alpha particles and turns into fermium-250. As many as 40 atoms per experiment were observed. As yet the 102 isotope has not been observed directly, because of its short half life. Its existence was demonstrated by observing the fermium daughter with a half life of 30 minutes. Under the conditions of the experiment the scientists could deduce that the fermium atoms observed could arise only from element 102 decay.

The element's discovery was made by radical new techniques of research. After curium target atoms captured a carbon nucleus, it flew out of the target, boiling off four neutrons, and the resulting 102 atom was attracted electrically to a conveyor belt. As 102 atoms decayed they jumped off the belt and were attracted to the foil where they were analyzed. The half life was determined by the distance from the target at which the fermium atoms were found on the foil. Chemical separation of the dissolved foil also identified the fermium atoms and, indirectly, the atomic number of the 102 atoms.

Mr. Ghiorso said he and his colleagues searched carefully and repeatedly for evidence of an isotope of element 102 reported last year by scientists of Argonne National Laboratory, Lemont, Ill., Harwell, England,

and The Nobel Institute for Physics in Stockholm, Sweden.

This group reported observing directly an isotope of element 102 with a half life of 10 minutes and emitting alpha particles of 8.5 MEV. They bombarded curium-244 with carbon-13 nuclei in the Stockholm cyclotron.

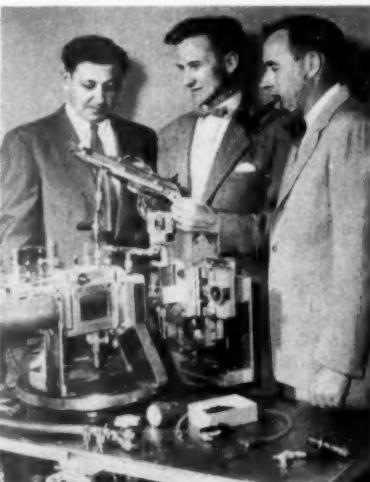
The California group attempted to duplicate this reaction with a curium target of the same composition. Their beam of carbon nuclei was about 10 times as intense, they reported. All their efforts were unsuccessful, Mr. Ghiorso said.

"An Open Question"

► THE PROJECT leader of the American section of the scientific team which reported the discovery of nobelium last year in Stockholm said he "is not discouraged" by the report of the California group.

Paul R. Fields, Argonne National Laboratory, Lemont, Ill., told SCIENCE SERVICE that the discovery of the element 102 isotope "still is very much an open question."

"We still are not sure whose report is correct," he said, "but I am sure scientists will come up with the right answer."



ISOTOPE DISCOVERERS — Albert Ghiorso, Torbjorn Sikkeland and John R. Walton, left to right, are three of the University of California Radiation Laboratory scientists who discovered an isotope of element 102, nobelium. Mr. Sikkeland holds a conveyor belt used to collect atoms of the element from the target. The target assembly is on the table.

Mr. Fields said he and his colleagues cannot understand why the California scientists have not been able to duplicate the Stockholm work, "although I have discussed it with Dr. Seaborg."

He said the original work will be repeated, probably next year, to find out if the results remain the same. The giant accelerator in Stockholm currently is being completely overhauled, Mr. Fields said.

"Dr. Seaborg saw our data in Sweden and talked with some of our team there," Mr. Fields said, adding that the international team was congratulated by the University of California scientist for their discovery of the isotope.

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● RADIO

Saturday, May 24, 1958, 1:30-1:45 p.m., EDT "Adventures in Science" with Watson Davis, director of Science Service, over the CBS Radio network. Check your local CBS station.

Dr. William Cooper, attending orthopedic surgeon, Hospital for Special Surgery, New York, and assistant professor of orthopedic surgery, Cornell University Medical College, will discuss "Children with Cerebral Palsy."

GENERAL SCIENCE

Russia Captures Key Science Post in UNESCO

► RUSSIANS are playing a larger role in UNESCO (United Nations Educational, Scientific and Cultural Organization). There is some fear they will come to dominate phases of the far-flung program emanating from the Paris headquarters.

A Soviet scientist, Dr. Stanislav Shumovsky, will become head of the UNESCO department of natural sciences on July 1, succeeding Dr. Pierre Auger, the French cosmic ray physicist, who becomes a consultant. Dr. Shumovsky is well-acquainted with science in the United States, as he has spent several years in this country.

Not until 1954 did the U.S.S.R. join UNESCO. Their delegates walked out of the London organization meetings in 1945. Now Russians are being given important posts in UNESCO as they become available.

A logical answer to this form of Russian penetration could be for the United States to take a greater interest in UNESCO and send representatives of sound technical competence to assume a full share of responsibility in the UNESCO administration.

Dr. Luther Evans, formerly Librarian of Congress, who has served almost six years as the Director-General of UNESCO is being urged by the United States as a candidate for reelection. This is considered important for American prestige.

The new Soviet activity in UNESCO is viewed as a phase of the cultural competition that has become a Kremlin policy. The Soviets have a large mission to UNESCO, totaling about 11, compared with four in the U.S.A. mission.

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GERIATRICS

Study Nation's Aged

While the United States is not in immediate danger of becoming a nation of old people, the problems of the aged and meeting their special needs must be studied today.

► **THE AGE FACTOR** may soon be abandoned as a retirement-determinant. The emphasis may swing to individual usefulness.

If this switch occurs, the medical profession will be called upon to play an important role in determining which individuals are mentally and physically capable of continuing work as they grow older, the director of the Center for Aging Research at National Institutes of Health, Bethesda, Md., has said.

Some new factors in the process of aging have evolved in recent years, Dr. G. Halsey Hunt told a group attending a meeting in Chicago of the Merrell Symposium on Aging. One of them is the fact that industrialization, urbanization and interdependent living have changed the pattern of life within a few years. Advances in medicine and allied fields during the same period have eliminated or controlled many of the old causes of death in infancy, childhood and early adult life. Therefore, more people are living into middle age.

One of the problems introduced by increased industrialization and urbanization is the lack of employment opportunities for older people. Elderly people tend to be

squeezed out of production work, with serious economic and psychological consequences.

In addition, many organizations have initiated retirement plans which encourage and sometimes force people to retire from work at specific ages. As a result, three-generation living is more difficult economically and less acceptable socially. We now have to pay increasing attention to the problems of caring for older people who cannot live by themselves even if they have sufficient money to pay the rent and grocery bills, Dr. Hunt said.

There were 14,700,000 persons over 65 years of age in July, 1957, compared with 12,200,000 in 1950. During the 1950's, this group has been increasing by about 350,000 yearly.

"While it is important to realize that we run no risk of suddenly becoming a nation made up entirely of old people, we cannot dismiss the problem lightly," Dr. Hunt said. Since older people require medical and institutional care out of proportion to their numbers, there will be increasing strain upon the traditional methods of providing medical and hospital care for old people.

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GEOPHYSICS

Meteorite Landing Dated

The Carbo meteorite has been dated by a study of its chemical composition and found to be more than 2,000 years old. It was found to contain no argon-39.

► **A METEORITE'S** chemical composition has been measured to show the heavenly fragment fell to earth more than 2,000 years ago.

Dr. E. L. Fireman of the Smithsonian Astrophysical Observatory, Cambridge, Mass., reported the new age measurements to the American Geophysical Union meeting in Washington, D. C. He said the time of fall of the Carbo meteorite was found from the helium-three it contained combined with the fact it contained no argon-39.

Dr. Fireman also reported he has measured the argon-39 content of the Sikhote-Alin meteorite, the first time this radioactive chemical had been measured in a meteorite.

Both helium and argon are rare gases present in meteorites as a result of nuclear reactions of cosmic rays. Measuring these chemicals yields information concerning the history and origin of meteorites, which are the only samples from outer space available to earthbound scientists.

Weathermen attending a joint meeting of the Geophysical Union and the American Meteorological Society learned of a new way to discover and trace turbulence in the atmosphere. Drs. Roscoe R. Braham Jr., E. L. Harrington and T. E. Hoffer of the University of Chicago reported that changes in the air's refractive index show its turbulent motions more accurately than other methods.

Dr. John A. O'Keefe of the U. S. Army Map Service told geodesists, scientists concerned with measuring the earth's size and shape, that orbits of satellites would have to be much higher than at present before observations of the objects would be valuable for mapping purposes. He said a special committee had recommended a 600-mile height as the minimum distance for the satellite's orbit.

The earth's crust under the Andes Mountains appears to be highly irregular, Dr. Merle A. Tuve, director of Carnegie Institution's Department of Terrestrial Magne-

tism, reported. He said studies of seismic records showed the roots of the Andes appeared to reach down about 33 miles. This is less than would be expected from their great heights, and confirms measurements showing the crust under the Rocky Mountains is also shallower than expected.

Dr. Cecil A. Nanney of the U. S. Naval Research Laboratory reported that microseisms increase before the occurrence of many large earthquakes and decrease afterwards. Dr. Nanney also found indications the direction in which microseisms are propagated may be associated with the location of significant earthquakes.

A new method for dating archaeological specimens was described by Drs. Irving Friedman and Robert L. Smith of the U. S. Geological Survey. They measured the thickness of the hydrated layer in thin sections of obsidian artifacts to date objects as old as 27,500 years.

Two Harvard University scientists proposed a new method for studying the earth's structure by pounding the earth to produce slight vibrations detectable by receivers thousands of miles away. Drs. Thomas Gold and Donald H. Menzel, director of Harvard College Observatory, suggested using a mechanical vibrator that would drive a shaking platform holding as much as hundreds of tons of rocks. This would produce seismic signals at frequencies of 10 to 100 times per second.

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PHYSICS

Claims Poorer Nations Shake Off "Myth"

► **THE BLOOM** is off nuclear energy for most of the world's underdeveloped nations.

This is the opinion of Dr. Stevan Dedijer, the Yugoslavian scientist who lost his job after writing an article for the *Bulletin of the Atomic Scientists*. (According to the Yugoslavian Government, it was not because of the article.)

Now, in an article for the current *Bulletin* (May), Dr. Dedijer discusses the "nuclear myth" that worked its spell on many underdeveloped countries and lulled them into thinking they could jump from the "wooden plow age into the nuclear age."

These countries based their hopes on an exaggeration of the role of nuclear energy in fostering development. They failed to foresee the cost and need for know-how. The result, he writes, is that this "nuclear myth" is now dead or dying.

"Where the myth has had a powerful grip on the community," Dr. Dedijer declares, "it may be one of the important factors that leads to a postponement for many years of the development of a research policy. Many a country having a powerful nuclear energy commission does not have a commission for research in agriculture, medicine, industry, or transport to fight for its share of the research cake, or a general body to study and advise on problems of the strategy of research development."

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PHYSICS

Computer Taught to "Hear"

An automatic computer has "learned" to recognize different sounds, spoken by either male or female voices, and was tested as giving 98% correct recognition.

► ONE STEP in teaching a computer to recognize human speech has been taken. An electronic "brain" has been taught to recognize the sound of the digits zero through nine when spoken by either male or female voices.

The automatic computer is correct 98% of the time, Drs. Carma Forgie, M. L. Groves and F. C. Frick of Massachusetts Institute of Technology's Lincoln Laboratory reported. They described the word-recognition achievement to the Acoustical Society of America meeting in Washington, D. C.

The scientists said the achievement showed a computer could be taught to make reliable decisions on the basis of a number of differing conditions, no one of which is in itself dependable.

The machine taught to identify words was Lincoln Laboratory's experimental computer, TX-O. A recording was made of ten speakers, male and female, reciting the digits zero through nine. The recordings of five of the speakers were then processed through the Resonance Vocoder developed by Haskins Laboratories. This provided a representation of speech, quantized in time, frequency and amplitude.

The machine was then instructed how to partition this information in various ways, classifying each bit of data as a vowel, consonant, a voiced consonant, simple vocalization or a stop. It was further instructed to discriminate among the vowels by an operation roughly equivalent to determining the frequency of the resonance peak.

None of these operations is linguistically

precise or reliable, the scientists reported. However, the effect of these transformations was to encode each set of samples into a short string of symbols reflecting the word's gross structure. These strings, or patterns, were then stored in the computer in association with the word from which they were derived.

This process is an elementary form of learning.

The recordings of the remaining five speakers were processed through the system. The computer was instructed to print out the words spoken for the full-ten-voice sample, on which it scored 98% correct recognition.

Science News Letter, May 17, 1958

PHYSICS

Controlled H-Bombs May Produce Electric Power

► HYDROGEN BOMBS exploded twice an hour in a very large, especially designed vault could produce 12% of the total electrical power used in the United States.

Dr. Jay Orear, Columbia University physicist, outlined his method of harnessing nuclear power to the American Physical Society meeting in Washington, D. C. He suggested an above-ground chamber be constructed in a canyon 400 feet wide. The canyon would be closed off by two dams about 700 feet apart and its walls lined with steel plate to a height of about 500 feet.

A dome-shaped steel roof strong enough to withstand a pressure of about 500 pounds

per square inch and covered with a deep layer of earth would complete the chamber.

A vault this size and strength could contain the force of a ten-kiloton nuclear bomb exploded 500 feet below the roof, Dr. Orear has calculated. A ten-kiloton detonation is equal to 10,000 tons of TNT and is considered a very small bomb.

Starting with an equal pressure on all sides of 150 pounds per square inch of wet steam, the ten-kiloton explosion would raise the chamber to a balanced temperature of several hundred degrees and pressure of 300 to 500 pounds a square inch, depending on the total quantity of water used.

Dr. Orear said the heat energy would then be extracted by pumping outside water through heat-exchanger pipes running through the upper part of the combustion chamber. The steam so generated would circulate through turbines and be condensed in the water reservoir behind the upstream dam.

"A single such chamber operating on two bombs per hour at an efficiency of 30% would produce 7,000,000 kilowatts, or 12% of the total United States electric power consumption," Dr. Orear concluded.

He recently completed a non-secret analysis of bomb test detection, part of a 20-part project on disarmament inspection sponsored by Columbia's Institute of War and Peace Studies.

One conclusion from this study was that nuclear weapons tests can be detected by measuring seismic waves, electromagnetic radiation and radioactivity.

Science News Letter, May 17, 1958

ANTHROPOLOGY

Skeletal Study Provides Accurate Identification

► NEW FACTS which may simplify the identification of unknown skeletons, both military and civilian, have been announced.

Recent findings indicate the old concept of regular skeletal growth are somewhat inaccurate. A study involving the skeletons of 450 American soldiers killed in North Korea revealed that bone growth is completed at varying ages. Previously, it was believed this variability of bone growth was negligible.

In addition, it was found that different bones of the same individual may age at different rates. These facts were discovered when the skeletons were examined. Each had a complete record, supplied by the Army.

"There are regular lagging and accelerating phases of bone growth, occurring at different ages in different individuals," Dr. T. Dale Stewart, Smithsonian Institution curator of physical anthropology, said.

This information will assist in the more accurate identification of bones found by law enforcement men. Furthermore, anthropologists will be better able to determine the exact age at death of buried skeletons.

Working with Dr. Stewart on this project for the Army was Dr. Thomas W. McKern of the Quartermaster Research and Development Center at Natick, Mass.

Science News Letter, May 17, 1958



"BATTLESHIP" TANK—A "battleship" tank for use as a reservoir for fuel in rocket engine systems gets its final welding. It is 45 feet long, has a diameter of almost eight feet and a capacity of 9,300 gallons. When in use the tank will feed fuels to rocket engine systems in development tests.

MEDICINE

Find Anti-Tumor Activity In Common Flower Bulbs

► A TUMOR-DAMAGING substance has been found in the bulbs of some narcissus, daffodils and other flowers commonly grown in American backyards.

Substances from snowdrops, snowflakes, narcissus and other members of the plant family amaryllis exhibited anti-tumor activity in mice, D. B. Fitzgerald, biochemist at the National Cancer Institute, Bethesda, Md., reports.

Experiments revealing these anti-tumor properties consisted of grinding the bulb of each plant. Those few flowers which did not form bulbs were tested by grinding the tuber or fleshy root. The ground pulp was suspended in water and the mixture was injected into cancerous mice.

The mice were killed 24 hours after injection of the mixture. Their tumors were inspected for signs of damage, such as, hemorrhage and necrosis, death of the tumor cells. Results indicate some of the most common flower bulbs produced the greatest damage.

The experiment also established that there are at least two anti-tumor compounds in the amaryllis flower family. Scientists are now working on the complete isolation and identification of these compounds. One substance has already been isolated from a variety of the narcissus in concentrations 100 times the original strength.

These isolated substances will be studied to understand better the role they play in damaging mouse tumors.

This connection between cancer and the amaryllis flower family is not a new one. Folklore and medical writings since ancient times have repeatedly mentioned this plant family as a potent tumor fighter in man, according to the report of this project published in the *Journal of the National Cancer Institute* (April).

Working with Mrs. Fitzgerald at the National Cancer Institute on this project were J. L. Hartwell and J. Leiter.

Science News Letter, May 17, 1958

PHARMACOLOGY

Antiseptic Compound Eliminates Gum Infection

► DEVELOPMENT of a local antiseptic that successfully eliminates painful gum infections caused by dental hypodermics has been announced.

The antiseptic, known as Betadine, is a combination of the chemical povidone and iodine. The use of iodine alone as an oral antiseptic is rare because it is irritating and bad tasting, Dr. James M. Jablon of the National Children's Cardiac Hospital and the department of medicine at the University of Miami, Miami, Fla., told scientists attending a meeting in Chicago of the Society of American Bacteriologists.

However, when iodine is combined with povidone, the rapid action and broad activity of iodine is retained while the combination eliminates the undesirable effects.

The hazard of gum infection is created by the number of microorganisms found in the mouth—streptococci, staphylococci, gram-positive and negative bacilli. When anesthetic is injected, these same microorganisms are sucked back into the hypodermic. They enter the gum when the same needle is used for multiple injections.

The combination antiseptic was swabbed on the gum with a sterile cotton pad before hypodermic injection in 31 patients. No bacteria were found on either the injection needles or the anesthetic cartridges in all 31 cases, Dr. Jablon stated.

Without the use of the antiseptic, 74% of the syringes used during 38 injections contained organisms.

Assisting Dr. Jablon in this project were Drs. Milton S. Saslaw and Doran D. Zinner, both affiliated with the hospital and university in Miami.

Science News Letter, May 17, 1958

SURGERY

Emotions May Hamper Recovery After Surgery

► PERSONAL EMOTIONAL reactions play a major role in determining the rate of recovery following an operation.

These personal human reactions range from mild apprehension to "psychotic disintegration," the complete break-down of organized behavior. Anxiety and fragile personality organization are two more factors which can influence the outcome of an operation.

Children who have not been prepared for an operation are particularly susceptible to fear and anxiety. Yet many hospitals either forbid or discourage visits by parents. Children who seem normal in the hospital may have prolonged after-effects when they return home, Drs. Norman Chivers and Theodore L. Dorpat, University of Washington School of Medicine, Seattle, report.

Fear of death plays an important role in emotional reactions, they say. Some of the body's organs have a high symbolic life-and-death significance. One such example is the heart. In a study of patients about to undergo heart surgery, a high proportion showed emergency defenses such as immobilization and hysterical amnesia.

Knowledge of, or identification with, someone who died following an operation may lead to undue anxiety. Children particularly are disturbed at the prospect of facing a minor operation after hearing of a death in the hospital.

The doctors' report appears in *GP* (May), published by the American Academy of General Practice.

Apprehension and emotional upset can be reduced by offering a forthright explanation of the whole surgical sequence.

Drs. Chivers and Dorpat agree that special consideration should be given to maintaining the patient's ties with his home and family. A child feels more secure when he has his favorite toy with him in the hospital. The presence of a key member of the family following an operation is also helpful, they conclude.

Science News Letter, May 17, 1958

IN SCIENCE

ORNITHOLOGY

Fuller's Earth Saves Oil-Soaked Birds

► FULLER'S EARTH, a kind of clay now used mainly as a filter and a catalyst in chemical reactions, may soon be solving a serious wildlife problem, U.S. Fish and Wildlife Service biologists report.

The problem is what to do about birds that land on oil-topped water. The oil has a tendency to mat a bird's feathers and prevent flight. The oil-coated birds often starve or, if rescued, can seldom be saved by the usual "rehabilitation" methods.

However, absorbing the oil with fuller's earth seems to be the answer.

Ordinary washing with soap or detergent also removes natural oils. A well-scrubbed water bird, however, sinks if it attempts to swim and is susceptible to pneumonia. It takes about two weeks before its glands secrete enough oil to bring it back to normal.

An English naturalist, who has been corresponding with the Fish and Wildlife Service, said the fuller's earth treatment is getting results in rehabilitating the water birds.

Science News Letter, May 17, 1958

MEDICINE

Some Stomach Cancers Are Really "Phonies"

► SEVERAL TYPES of stomach inflammation and irritation resemble cancer and are frequently diagnosed as such.

These "pseudo-cancers" are not malignant, although they are sometimes labeled as malignant lymphoma of the stomach, or cancerous invasion of the lymphatic system, Dr. J. Leslie Smith Jr. told a group attending the American Association of Pathologists and Bacteriologists meeting in Cleveland.

Many times the disease is caused by lymphoid hyperplasia, overproduction of lymph-like tissue, or gastric ulcers, both of which result in benign growth.

Cancerous tissue and the benign tissue resulting from the mentioned disturbances resemble each other. However, certain subtle differences can be detected under the microscope.

A recent study conducted by Dr. Smith and a colleague, Dr. Elson B. Helwig of the Armed Forces Institute of Pathology, Washington, D. C., also revealed malignant lymphoma of the stomach, when localized to this organ, has a marked biological difference from those lymphoma which spread to the stomach from other parts of the body. When this type of cancer is localized to the stomach only, the possibilities for cure are very good, Dr. Smith said.

Science News Letter, May 17, 1958

SCIENCE FIELDS

ENTOMOLOGY

**Silica Dusts
Control Cockroaches**

► EXPERIMENTS at the University of California at Los Angeles may provide faster and surer control of cockroaches.

Assistant entomologist I. Barry Tarshis achieved "startling" results on the household pest by using an inert, non-toxic dust.

Sprinkled on the floor of cages, silica aerogels in the group known as Syloids killed 100% of the German cockroaches in three-fourths to one and three-fourths hours. The American and the Oriental cockroach died within four or five hours.

Currently used insecticides, on the other hand, required a much longer period to kill cockroaches, Mr. Tarshis notes. And results were not always 100%.

The powder kills by adsorbing an oily protective film that covers the entire body of the cockroach and normally prevents loss of water. Thus the powder kills through desiccation, literally drying the insect to death.

The three species Mr. Tarshis tested have been showing increasing resistance to common insecticides in recent years.

Because the finely ground dust has no chemical action, cockroaches may not develop the ability to resist it, Mr. Tarshis believes.

The treatment works either as a preventive or as a control. The insect has only to come in contact with the dust by crawling through it.

Science News Letter, May 17, 1958

ENTOMOLOGY

**"Old Maid" Bees
Do the Most Work**

► "OLD MAID" bees work harder than mated bees.

Such "old maid" bees, with mouths worn and wings tattered from the hard work of pollen gathering, have been found in the nest of societies of bees in Brazil.

This is reported to *Science* (May 2) by Dr. Charles D. Michener of the University of Kansas, who worked on collaboration with Dr. Rudolf B. Lange of the Instituto de Historia Natural and Faculdade Católica de Filosofia, Curitiba, Paraná, Brazil.

During January and February, the height of the South American summer, between 15% and 20% of the females dissected were unmated, the entomologists report. In some cases this was because they were young, but others showed the wear and tear of age and presumably would not mate. Apparently, they were "old maids" from choice.

Some of these "old maid" bees showed the ravages of age and hard work to a much greater extent than did any of the fertilized bees of the same age.

Over half of the pollen collectors studied were unmated, and the scientists believe that most or all of the unmated bees of the species *Augochloropsis sparsilis* become pollen collectors.

"It is easy to see that the presence of such active, unfertilized bees might be an advantage to a colony, even though they are nonreproductive," the scientists say.

The scientists conjecture that the hard-working habits of the "old maid" bees served as a preadaptation that resulted in the evolution of a worker caste in bee colonies.

Like the human spinster, the "old maid" bees occupy the same nests with mated females and a division of labor is established, some females laying the eggs while others go out to work.

And it is the "old maid" who does the most work.

Science News Letter, May 17, 1958

AGRICULTURE

**Paper Boxes and Wax
Made From Sugar Cane**

► HEAVY PAPER boxes and shoe polish may be the result of two new processes developed by U. S. Department of Agriculture scientists that promise to make use of a big waste—sugar cane residues.

Bagasse, the fiber-like residue left when the sugar is extracted from sugar cane, has been successfully made into heavy corrugated paper shipping boxes.

In laboratory tests, the U. S. Department of Agriculture reported, 75% of the bagasse boards were equal or superior to comparable commercial boards.

As part of a USDA research program, 12,000 bottle and can boxes were manufactured and given both laboratory tests and shipping durability tests. The bagasse board boxes were described as stiffer and not as soft as regular boxes.

New refinements in the screen separation of cane fiber and pith, developed at USDA's Northern Utilization Research and Development Division at Peoria, Ill., have removed a "major obstacle to economical and effective pulping of bagasse."

This use for sugar cane residues is expected to help satisfy the growing demand for boxes and containers. In 1956 about 7,000,000 tons of pulp and paper were used for this purpose. By 1965, the amount is expected to increase by 40%.

The development of a low-cost process for extracting wax from sugar cane also may give cane growers an added income.

The only wax-extraction process yet devised that is suitable for the small- and medium-sized sugar mills found in this country, it produces a hard, lustrous wax.

The new sugar cane product is similar to carnauba wax, which constitutes about three-fourths of the United States' vegetable wax imports which are valued at about \$10,000,000.

Large scale studies are needed before the new process will be ready for commercial use, USDA researchers report.

Science News Letter, May 17, 1958

SEISMOLOGY

**Cut Earthquake Damage
Through Maps and Codes**

► EARTHQUAKE damage could be reduced through the proper use of zoning maps and building codes based upon soil conditions.

According to C. Martin Duke, professor of engineering at the University of California at Los Angeles, it is generally true that soft valley or seashore soil deposits amplify earthquake wave motions and make a riskier foundation than hard, hilly ground.

Prof. Duke, whose investigations have carried him to Japan and Mexico, cites as an example the 1957 earthquake which occurred 50 miles from Acapulco. Acapulco itself, built on granite, remained almost unharmed, while Mexico City, 200 miles from the quake's center but resting on a soft lake bed, was badly damaged.

Similarly, during the 1906 San Francisco quake, residents in the soft filled land section near the bay were much harder hit than those living on the rocky soil of the seven hills.

Japan has acted on these findings by zoning its major cities according to soil conditions, and requiring greater strength in structures on the soft soil sections.

California and other earthquake-prone states could well benefit by the Japanese example, Prof. Duke believes. He advocates more intensive theoretical and experimental research by engineers, which should lead to more realistic building coding in earthquake-prone zones.

Science News Letter, May 17, 1958

MEDICINE

**Cosmetic Use of Tattooing
Reported by Surgeon**

► MEDICAL SPECIALISTS now have a new use for the ancient art of tattooing.

The technique of tattooing has been successfully applied to reshaping and redefining a distorted lipline. It also promises to be a beneficial technique in other problem cosmetic cases, Dr. Norman C. Lake, consulting surgeon at Charing Cross Hospital, London, England, reports in the *British Medical Journal* (May 10).

Dr. Lake describes improvement of an ugly scarred lip having virtually no red margin because the patient had undergone a hare-lip operation in infancy.

By applying a template, a metal plate defining the desired lip line, and tattooing with a mixture of red oxide R.93A and irlaglate orange P, a lip was drawn that looked genuine.

Many such templates can be made to outline desired areas to be tattooed. In this manner, eyebrows, lips, and receding hairlines can be redefined, Dr. Lake says.

Other uses of the tattooing technique could include an imitation beard-stubble for dark-haired men with pale facial skin grafts or scars, and nails drawn after the amputation of the ends of toes or fingers.

Science News Letter, May 17, 1958

ROCKETS AND MISSILES

Space Age Art

The rockets launched from test firing sites are decorated with black, white and colored designs that have no meaning as art, but add significant scientific meaning to firings.

By DAVID PURSGLOVE

► THOSE BLACK AND COLORED stripes, squares and odd geometrical shapes you see in pictures of rockets fired at Cape Canaveral or other sites are not just decoration to make the rocket attractive to the eye, or even to help identify it.

Nor are the strange markings there to help track the missile. It is easier to track and photograph a solid white missile.

Viewed only as artistic designs, the strange markings have no significance. However, for scientific purposes, they have been very carefully planned. Each enables scientists and engineers to gain valuable information from a missile in flight.

The black bands painted around a rocket's girth and the long straight or spiraling stripes are motion picture photographic reference points from which missilemen can compute the rocket's rate of rotation, its pitch and yaw, angle of flight at a specified point in flight, and even deviation from predicted course.

Although most of the stripes are black, some are colored for greater clarity in color shots of the shoots.

Occasionally a rocket will carry small, round or square patches of paint. These are protective paints either to resist corrosion at sensitive points, or to protect delicate instruments inside the rocket at that point from excessive heat.

Since, in the case of large missiles, about ten pounds of propellant are needed to move one pound of paint, paints generally are used sparingly. Most large missiles either remain unpainted, or are protected with a very thin coat of lightweight lacquer.

However, protective paints do guard against corrosion and high temperatures to some extent, although their advantages sometimes are offset by their weight. Small, short-range missiles in which weight is not such an important factor usually are painted. Sometimes paint is used to make the missile harder to see.

"Operational" Means Olive Drab

Test-firing models of the Army's Redstone may be marked distinctively for scientific purposes, but operational models now in the hands of our overseas troops are painted olive drab to help prevent their detection by reconnaissance forces or aircraft.

The Navy's Vanguard satellite vehicle is basically olive drab, except for the unpainted stainless steel second stage. There are black reference lines on the first stage and near the top of the second stage. In launching site pictures the second stage usually looks white instead of silvery. This is the stage

that holds containers of extremely cold liquid oxygen which causes that stage's exterior to become coated with frost.

Vanguard officials considered painting the entire vehicle white as an aid to photographers. However, as one official told SCIENCE SERVICE, "the photographers bowed to the scientists' information requirements."

The highly polished spherical satellite is "glass coated" with a very thin coat of silicon monoxide for heat protection by reflection.

Vanguard, incidentally, carries no letter or numerical marking. Neither the words "Navy" nor "Martin," the builder, appear anywhere on the rocket. The nose cone of

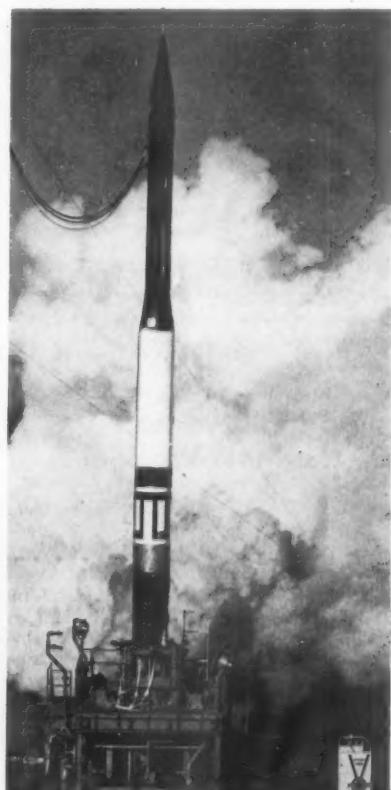
the Vanguard launching vehicle is black for no particular reason.

However, nose cones of Jupiter-C rockets used to launch the Army Explorer series satellites use a special paint combined with carefully planned art work to help control internal temperature.

Jupiter-C nose cones carry black and white stripes, whose width and spacing are governed by the predicted rate of spin. Black areas absorb heat and white areas reflect heat.

As these areas spin, like stripes that might be painted on an artillery shell, the internal nose cone temperature is held within a desirable range as the rocket passes from the high temperatures of early stage air friction to the extremes of heat and cold encountered in the rocket's orbital path.

Temperature control is aided by the use of a special zirconium oxide paint for some of the stripes. This paint is compounded



SPACE AGE ART—Gaudy designs on rockets are carefully planned to yield valuable scientific information. The Jupiter-C Explorer satellite-launching rocket in the Army photograph at the left carries bands and spiral stripes from which engineers can compute its rate of rotation, pitch and yaw. Different designs perform the same function on the Vanguard satellite vehicle shown in the Navy photograph at the right. The second stage is unpainted stainless steel, but appears white due to a frost coating caused by extremely cold liquid oxygen carried in that section.

to absorb and release heat under various flight environment conditions.

Some of the most important painted designs in our missile program are on the inside of rockets where they never are seen by the public. These are stripes and patches of temperature-sensitive paints that change color permanently upon exposure to varying temperature ranges. They are the same paints used to record variations in temperature along a machine gun barrel or to indicate where a furnace is leaking heat.

These paints reduce the weight and cost of recoverable re-entry missiles such as the X-17 and Jupiter-A by eliminating many thermocouples previously used to record interior temperatures. Thermocouples still are used at points requiring very exact temperature measurements.

The most significant development in missile development is anti-radar paint which greatly reduces chances of radar detection of missiles and aircraft. (See SNL, April 19, p. 245.)

Science News Letter, May 17, 1958

ENGINEERING

"Who Is Safe Driver?" Simulator to Find Out

► DESPITE MILLIONS of automobile accident reports, nobody really knows the answer to the question, "Who is a safe driver?"

Within the next five years, a research team from the Institute of Transportation and Traffic Engineering of the University of California at Los Angeles will try to find out.

The primary research tool will be a driving "simulator," costing from \$250,000 to \$500,000, and so complex that some of its components have yet to be manufactured.

When completed, the simulator will faithfully recreate the sight, sound and feel of driving in actual Los Angeles traffic and make possible the scientific measurement of the driver's reactions to traffic snarls, road signs, long drives and other factors.

Its planners are John H. Mathewson, assistant director of ITTE, Slade Hulbert, assistant research psychologist, Heinz Haber, physicist and lecturer in engineering, and Charles Wojcik, associate research engineer.

The simulator will consist of an integrated system of an actual vehicle mounted on a roller-type treadmill, surrounded by a circular screen, with television projectors and remote TV cameras coordinated with the driver to feed back the changing traffic situations to the screen by way of computers and servo-mechanisms.

In contrast to existing simulators for classroom driving instruction, which show an unchangeable motion picture film, the TV screen on the ITTE simulator will vary the traffic scenes to reflect the responses of the drivers.

The rate of progress and success of the simulator program will depend largely on the amount of funds available to the group.

When all the results are in, the ITTE group hopes to present a set of tested standards for safe driving to control licensing, teach high school students, and cut down costly traffic accidents.

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DEMOGRAPHY

Study Red Populations

► NO EVIDENCE has been found that the Communists keep a double set of books on population, one for their own planning use and the other for propaganda and foreign consumption.

We can use the figures published for Russia and for Communist China if we make proper allowance for errors and for their difficulties in collecting data, a group of statisticians of the U. S. Bureau of the Census reported to the Population Association of America meeting in Chicago.

The American statisticians believe they have found evidence that the Chinese have minimized the tremendous numbers in their population. The Chinese announced that on June 30, 1953, their people numbered 582,600,000. Actually, there are probably a minimum of 595,000,000 people in China and possibly as many as 600,000,000, Drs. Lawrence Krader and John Aird reported.

In taking a census, he commented, there are always some people missed and some counted twice, but there is reason to think that in China the number lost is larger than the number counted twice.

In addition to the number who never were found to be counted, there is another reason why the count may not have been complete. The census takers were also listing people for voting purposes. Some of the inhabitants, for understandable reasons, may have been reluctant to give their political affiliations.

METEOROLOGY

Hurricane Paths Probed

► THIS YEAR marks a vastly stepped-up program to probe the formation, structure and paths of hurricanes, the giant tropical storms that roar northward toward the Gulf or East Coasts leaving death and destruction in their wake.

At the American Meteorological Society meeting in Washington, D. C., hurricane experts outlined what they have learned about past storms and how they plan to study future ones.

One experiment the Weather Bureau stands "ready and willing" to conduct is the possibility of changing a baby hurricane's direction of movement or intensity before it develops into a full-scale storm. This could be done by "seeding" the storm clouds, perhaps by spraying water into them from airplanes. It will, however, be done only when conditions are right, and when there is no chance of veering it into a land area.

Another plan is to place in the hurricane's eye, the relatively calm center, a constant-level balloon equipped with a radio transmitter that would constantly send out information on the storm's course.

As in many years past, research aircraft carrying the latest meteorological instruments, accurate navigation devices and

The population in Russia has been moving around, Dr. Frederick Leedy, also of the Census Bureau, told the meeting. But the principal shift has not been, as some Americans may imagine, to Siberia.

The movement in Russia, as it is the world over, is mainly from the farm and country regions to the city. There is a population shift eastward, but the biggest part of this is to new industrial centers there. Some agricultural people are moving to virgin land areas that have opened up.

There has been tremendous growth in Siberia, Dr. Leedy said, but that increase is not high in proportion to the total increase.

Despite the Communist programs to encourage larger families, the fertility rate of Russian women is declining, Dr. James Brackett stated.

Two big factors Dr. Brackett believes may be responsible for this drop in fertility. First is the housing shortage. Many young people in Russia live in dormitories. It is very hard to find housing for the couple who wants to get married and start a family, and the accommodations are very poor even for those lucky enough to find something.

The other important factor is the employment of women on a mass scale. Dr. Brackett foresees no alleviation in the employment of women in the next five years.

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radar will fly into the storms to get an overall picture of its structure.

Robert H. Simpson, director of the Weather Bureau's National Hurricane Research Project, West Palm Beach, Fla., reported evidence that hurricanes do not have the uniform structure they once were thought to have. He said simultaneous flights into 1957's Hurricane Carrie showed systematic eddies, some of which might be identified as false "eyes," throughout the entire storm.

Hurricane movements can be predicted more accurately by determining the winds near the center of the storm's swirling vortex, Robert C. Gentry, also of the Hurricane Research Project, reported. He said by measuring the strength and direction of winds immediately surrounding the center, the hurricane's future path could be plotted mathematically. Although his calculations have so far been made only for past storms, the method will be tested this year for the still-unborn hurricanes of 1958 as they are spawned.

accuracy in forecasting hurricane paths with

Several scientists also reported greater electronic computers because of continued improvements in the mathematical models of tropical storms.

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Books of the Week

For the editorial information of our readers, books received for review since last week's issue are listed. For convenient purchase of any U. S. book in print, send a remittance to cover retail price (postage will be paid) to Book Department, Science Service, 1719 N Street, N.W., Washington 6, D. C. Request free publications direct from publisher, not from Science Service.

ANALYZING PSYCHOTHERAPY—Solomon Katz-enbogen—*Philosophical Lib.*, 126 p., \$3. A psychiatrist presents concisely what he practices in psychotherapeutic sessions.

ANATOMIST AT LARGE: An Autobiography and Selected Essays—George W. Corner—*Basic Bks.*, 215 p., \$4. An informal autobiography of an eminent biologist.

ANIMAL CLOSE-UPS—Theodore McClintock—*Abelard-Schuman*, 160 p., illus. with photographs by Desider Holisher, \$3.50. A picture book for the animal lover.

ARCHEOLOGICAL INVESTIGATIONS AT THE MOUTH OF THE AMAZON—Betty J. Meggers and Clifford Evans—*Govt. Printing Office*, Smithsonian, Bureau of American Ethnology Bulletin 167, 664 p., 112 pl., illus., \$5. Report of an archaeological expedition in a part of the world where a dugout canoe is the most practical form of transportation.

ARCTIC BIOLOGY: Eighteenth Annual Biology Colloquium—Henry P. Hansen, Ed—*Oregon State College*, 134 p., illus., paper, \$2.50.

ATLAS OF THE SKY—Vincent de Callatay, translated and prefaced by Sir Harold Spencer Jones—*Macmillan (St. Martin's)*, 157 p., illus., \$12.50. With beautiful photographs and an abundance of star maps.

BASIC ELECTRICITY—Abraham Marcus—*Prentice-Hall*, 493 p., illus., \$4.85. A text for beginners.

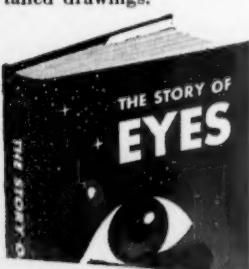
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by S. SUTTON-VANE

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BIOLOGY FOR YOU—B. B. Vance and D. F. Miller—*Lippincott*, 4th ed., 654 p., illus., \$4.80. A high-school text.

THE BIOTIC WORLD AND MAN—Lorus J. Milne and Margery J. Milne—*Prentice-Hall*, 2d ed., 530 p., illus., \$7.95. A beautifully illustrated text for beginners.

CLOUD STUDY: A Pictorial Guide—F. H. Ludlam and R. S. Scorer—*Macmillan*, 80 p., illus., \$2.95. To help you to recognize and understand the meaning of various types of clouds.

COLLEGE PHYSICAL SCIENCE—Wendell H. Slabaugh and Alfred B. Butler—*Prentice-Hall*, 496 p., illus., \$7.95. Within this text are unit groupings that could be selected as the basis for shorter courses.

THE COSMIC RADIATION—J. E. Hooper and M. Scharff—*Wiley*, 172 p., illus., \$2.75. An introduction to the subject suitable for students and physicists in other fields.

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EARTH'S SHIFTING CRUST: A Key to Some Basic Problems of Earth Science—Charles H. Hapgood with collaboration of James H. Campbell, foreword by Albert Einstein—*Pantheon*, 438 p., graphs, \$6.50. Presenting material supporting the author's displacement theory. The Einstein foreword was written for the manuscript sent to him in May, 1953.

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THE THEORY OF FUNCTIONS OF A REAL VARIABLE AND THE THEORY OF FOURIER'S SERIES: Volume II—E. W. Hobson—Dover, 778 p., paper, \$3.

Science News Letter, May 17, 1958

ENTOMOLOGY

"Scent Waves" Lure Insects to Their Doom

► ENTICING "scent waves" are luring insect pests to their doom.

The wandering gypsy moth or hungry Mediterranean fruit fly may think it is on the trail of a female moth—or a good dinner—but chances are the scent is a trap. The smell is probably one of many natural and synthetic attractants developed by U. S. Department of Agriculture scientists as weapons to combat insect pests.

The attractant can be used in two main ways: it lures the insect to baited traps or, mixed with insecticides, lures the insect to eat the deadly bait. USDA scientists used the first method in their gypsy moth eradication program in New York, New Jersey and Pennsylvania. Male moths were lured from distances of at least a half mile. Trapped, they provided scientists with means of checking just how successful insecticide sprays were when applied this season. Future estimates of needs for spraying can be made.

Chemists are screening hundreds of natural plant materials and many organic synthetics in the hope of turning up new attractants. Common weeds, obnoxious plants, vegetables and flowers are all being investigated.

When working with synthetics, the chemists usually begin without knowing if they will find an attractant. Sometimes 100 or more related compounds will be tested to make sure no possibility is overlooked. In this way scientists prepared three related organic compounds, each one better than the last, to use as attractants in Florida's battle against the Mediterranean fruit fly. The best one, also being used to replace the natural attractant angelica-seed oil, is the sec-butyl ester of 6-methyl-3-cyclohexene-1-carboxylic acid.

Science News Letter, May 17, 1958

Funkiko, Formosa, holds the rainfall record for two days at 65.8 inches and for three days at 81.5 inches, both established in the same storm in 1915.

ENTOMOLOGY

Insect Danger May Grow

► INSECT PESTS, if not surplus crops, may soon be troubling the farmer who participates in the Soil Bank Program and keeps some of his acreage out of production.

Grasshoppers, aphids, cutworms, leafhoppers and Japanese beetles are some of the destructive insects that are likely to thrive on this reserve land.

"General surveillance" has become the watchword for Federal, state and local scientists studying insect conditions.

Some 28,000,000 acres of reserve land offer a great deal to insect pests. Numbers of cutworms, wireworms, European chafer, corn flea beetles are likely to build up in sod or fallow land and damage crops planted later.

Thrips and aphids probably will increase on the grasses and soil-building legumes substituted for basic crops. The pea aphid, for example, develops on alfalfa and may migrate to and severely damage peas.

The probable increase in destructive insects will be aided by favorable host plants, greater variety of food plants and a more generally desirable habitat which includes more trees planted under the conservation reserve part of the Soil Bank Program.

Some beneficial insects, such as bees and insect parasites and predators, can be expected to profit from the undisturbed land. Reserve acreage might also be useful as trap crop areas. Migratory insects could be controlled by spraying fields when they moved in.

The U. S. Department of Agriculture points out that nationwide observation of insect conditions has become more important. The problem is not a matter of local control. It will also be essential to keep larger areas informed on "significant changes" in insect populations.

Science News Letter, May 17, 1958

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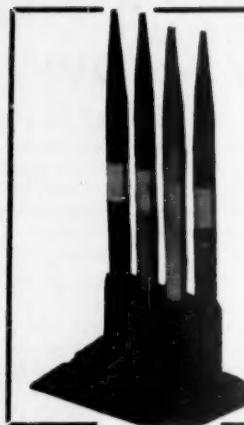
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BIOLOGY

Dying Changes Rate Body Uses Fuels

► APPARENTLY the body burns fuels at almost the normal rate even in the throes of cancer, starvation or paralyzing polio.

Only as death begins to set in is there a radical change. Then the burning of "fuels," sugars, fatty acids and amino acids, takes a big drop from the normal.

These puzzling observations have been reported by a group of scientists at the University of California, Dr. Benjamin Siegel of the San Francisco Medical Center and Drs. Ann Hughes and B. M. Tolbert of the Donner Laboratory in Berkeley.

During their experiments the scientists fed mice "fuels" tagged with radioactive carbon. A special device allowed the scientists to collect the carbon dioxide breathed out by the animals. The amount of radioactive carbon in the expired air indicated the rate of "fuel" burning.

The scientists found a small but insignificant drop from normal in "fuel" burning up until the animals became moribund, when there was a big decrease in the ability of the body to break down the compounds.

The findings were surprising, since the scientists expected that a normal, frisky animal would use up fuels at a much faster rate than a paralyzed animal or one that is starving or afflicted with serious cancer.

The scientists do not know the reason for the essentially similar "fuel" burning patterns, but feel the findings are a fruitful starting point for further studies.

Science News Letter, May 17, 1958

Questions

AGRICULTURE—What is bagasse? p. 313.

MEDICINE—What family of flowers has been found to contain a tumor-damaging substance? p. 312.

METEOROLOGY—How long is the half-life of naturally formed carbon-14? p. 308.

PHYSICS—What are the two main requirements of methods of design to control thermonuclear reactions? p. 307.

ROCKETS AND MISSILES—Why does the Jupiter-C nose cone carry black and white stripe markings? p. 314.

Photographs: Cover, Radiation Laboratory, University of California, Berkeley; p. 307, U. S. Atomic Energy Commission; p. 309, University of California; p. 311, Allegheny Ludlum Steel Corporation; p. 314, left, U. S. Army, right; U. S. Navy; p. 320, Eastman Chemical Products, Inc.

ANIMAL HUSBANDRY

Blood Tests Used To Identify Dairy Cattle

► BLOOD TYPING dairy cattle may soon be as effective in identifying cows as fingerprints are in identifying humans.

Scientists at state experiment stations, the U. S. Department of Agriculture and in several foreign laboratories are cooperating in a study to learn how blood type is related to genealogy and how to test for blood type.

Some 50 antigenic factors—far more than humans have—are the basis for blood types in cattle. Combinations of these factors make up blood types so there are literally millions of possible types. Scientists have found some factors occur more often in one breed than in others.

Except for identical twins, or fraternal twins whose blood intermixed in the embryo stage, blood typing a cow or a bull will provide permanent identification. USDA scientists believe that if blood types are found to be related to other characteristics of cattle, advances in cattle breeds may result.

Do You Know?

Virgin red cypress logs, sunk in mud and water for 60 years and now recovered in a sort of "mining" operation, make lumber that brings premium prices for the manufacture of liquid-storing tanks.

Lung cancer is reported to be only 10% as frequent and heart attacks 60% as frequent in a group of non-smoking males as compared to the general male population.

The part of the cell that is involved in an animal's defense against transplanted human cancer has been pinpointed for the first time.

The first practical balloon was invented by two French brothers, Joseph and Etienne Montgolfier, paper bag manufacturers.

A newly developed fat emulsion now permits high caloric intravenous feeding in the critical period following surgery.

Nuclear fuel pellets, each one approximately the size of the filter tip on a cigarette, are being made from uranium powder.

The world's largest solar furnace will soon begin taking shape near Cloudcroft, N. Mex.

• New Machines and Gadgets •

For sources of more information on new things described, send a self-addressed stamped envelope to SCIENCE NEWS LETTER, 1719 N St., N.W., Washington 6, D.C., and ask for Gadget Bulletin 935. To receive this Gadget Bulletin without special request each week, remit \$1.50 for one year's subscription.

❶ **SAWHORSE LEGS** that fold can be attached to a standard wood two-by-four. A twin locking system holds the legs in either the folded or unfolded position. Made of aluminum, the legs are available in 20- or 30-inch heights.

Science News Letter, May 17, 1958

❷ **VERTICAL SHEET FILE** for single large sheets such as blueprints and maps permits individual filing. The file consists of a wall mounted bracket that holds up to 150 aluminum hangers. Tubular tape is attached to the sheet and it can then be slipped on or off the hanger. A cabinet is available.

Science News Letter, May 17, 1958

❸ **STAR POINTER** is a finding device that computes and points out 100 constellations, and other celestial objects. Designed for beginner or professional, the star locator comes complete with 36-page booklet of settings, charts and eight star maps.

Science News Letter, May 17, 1958

❹ **DIAPER CONTAINER PAIL** has a lid which, when raised, dispenses a few drops of a liquid that is said to prevent the formation of ammonia. The container, shown in the photograph, is made of a polyethylene



plastic and is available in a wide variety of colors. The pail is resistant to odors, moisture and acids, and can be washed.

Science News Letter, May 17, 1958

❺ **RETURNABLE CONTAINER** for use in the shipment of corrosive chemicals is made of plastic and steel. It consists of a

polyethylene inner container and a steel drum outer jacket. It is available in two sizes, the standard 14-gallon and a heavy duty 13-gallon.

Science News Letter, May 17, 1958

❻ **HAND-SIGHTING LEVEL** is operated like a telescope. It will provide a level line of sight for laying out driveways, gardens, ditches or establishing fence lines. The level is said to be accurate within one-third of one degree.

Science News Letter, May 17, 1958

❼ **INTERCOM CONTROL UNIT** converts any public address system to an intercom and paging system that will accommodate up to 40 remote locations. The unit requires no A.C. power and includes a volume control, talk-listen-program switch and an all-call switch. A built-in speaker serves as a microphone.

Science News Letter, May 17, 1958

❽ **BATHTUB BABY SEAT** is anchored in the tub by four suction cups. Made of aluminum that is said to warm to the temperature of the water, the seat has a nonabsorbent vinyl plastic foam cushion. The seat also has a plastic safety belt.

Science News Letter, May 17, 1958



Nature Ramblings



By HORACE LOFTIN

► THE TUNG TREE comes into beautiful flower early in spring, the beginning of a series of events leading to oil-rich tung nuts late in summer or fall. A few days after the flower buds begin to open, the ground under and around the tree becomes carpeted by thousands of snow-white blossoms touched with streaks of brownish red.

If you look at the tree branch where these flowers were attached, you will find only the naked stem. No young fruit remains behind to furnish the fall harvest. Where, then, do the nuts come from?

You have to take a second, closer look to learn the answer. It is the flower that did not fall to the ground that furnishes the nut. The great majority of the tung flowers, the ones that fall first, are of the male sex

Perfect and Imperfect



only. The remaining flowers are female. When fertilized, they give rise to the nuts that provide the next generation of tung plants.

The majority of flowering plants contain the organs of both sexes in each individual flower, as in the lily shown in the illustra-

tion. Single flowers with both stamens, the male element, and pistils, the female element, are termed "perfect" flowers.

Flowers such as the tung tree bears are called "imperfect," since each contains either stamens or pistils, but not both. A further distinction can be made in the sexuality of imperfect flowers. In some cases, such as with the tung, both male and female flowers occur on the same plant. This condition is called "monoecious," which means "one household."

In other plants with imperfect flowers, such as the willows and Christmas holly, the sexes occur separately, one individual plant producing all male flowers while another has only female flowers. These plants are termed "dioecious," meaning "two households."

Science News Letter, May 17, 1958

